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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Anthony J. Ruggiero

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EXAMINER

LEUNG, CHRISTINA Y

ART UNIT

PAPER NUMBER

2613

DATE MAILED: 05/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)	
09/827,454	RUGGIERO, ANTHONY J.	
Examiner	Art Unit	
Christina Y. Leung	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-23, 34-41 and 45-49 is/are allowed.
- 6) ☒ Claim(s) 24, 26, 27, 29-31, 33 and 42-44 is/are rejected.
- 7) ☒ Claim(s) 25, 28 and 32 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Introductory Comments

1. In the Decision on Appeal dated 18 January 2006, the Board of Patent Appeals and Interferences sustained the rejection of claims 42-44 and did not sustain the rejection of claims 1-41 and 45-49. However, because the scope of independent claim 24 is similar to the scope of claim 42, and in light of the comments of the Board on pages 15-16 of their Decision on Appeal, **prosecution on the merits is hereby reopened.**

Prosecution has been reopened primarily to present a new rejection of claim 24 over the same references presented in the previous rejection of claim 42 (Pepper et al. in view of Vasil'ev et al.). Examiner acknowledges that claims 26, 27, 29, 30, 31, and 33 are also newly rejected in this Office Action but do not recite similar limitations as claims 42-44. However, they depend on independent claim 24, which is now currently rejected over Pepper et al. in view of Vasil'ev et al. Examiner respectfully submits that the combination of Pepper et al. in view of Vasil'ev et al. also includes the limitations recited in claims 26, 27, 29, 30, 31, and 33.

Examiner notes that the rejection of claims 42-44 in the present Office Action, under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. in view of Vasil'ev et al., is essentially identical to the one previously presented by Examiner and sustained by the Board in the Decision on Appeal dated 18 January 2006.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

Art Unit: 2613

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 24, 26, 27, 29-31, 33, and 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pepper et al. (US 5,038,359 A) in view of Vasil'ev et al. ("Phase-conjugation broad area twin-contact semiconductor laser," Applied Physics Letters, July 1997).

Regarding claims 24, 26, 27, 29-31, and 33, Pepper et al. disclose an optical interconnection system (Figure 1) comprising:

a fiber optic device (laser 20) constructed to transmit an interrogating beam; and
a micro-mirror (reflector array 16; column 7, lines 11-22) adapted to receive the interrogating beam and transmit the beam to a predetermined phase conjugator 12 (column 5, lines 24-61).

Figures 4 and 5 also show similarly numbered elements arranged in slightly different embodiments but still disclosing the elements as discussed above with regard to Figure 1.

With regard to a "fiber optic device," Pepper et al. specifically disclose that the system they disclose may be used in fiber optic applications (column 5, lines 19-23). It is also well known in the art that the laser element 20 such as they disclose may be suitable for use in a fiber optic system. The claim does not specifically recite optical fiber.

Regarding claims 26 and 29 in particular, Pepper et al. disclose that the interrogating beam interacts with at least one pump beam operating in the phase conjugator in a substantially parallel manner (Figure 4) or at a transverse angle (Figure 1).

Regarding claims 30 and 31 in particular, Pepper et al. further disclose that the predetermined phase conjugator is one of a plurality of phase conjugators arranged in a array (Figure 9, elements 148-150, for example, or Figure 10, elements 174, 176, and 178). Pepper et

Art Unit: 2613

al. do not specifically disclose a plurality of arrays of phase conjugators, but it would have been obvious to a person of ordinary skill in the art to include a plurality of arrays of phase conjugators in the system disclosed by Pepper et al. as an engineering design choice of a way to arrange the phase conjugators especially since Pepper et al. teach that any number of phase conjugators may be included (column 11, lines 14-17). One in the art would have been particularly motivated to include a plurality of arrays so that more than one beam may be received by the phase conjugator system at more than one specific location.

Regarding claims 24, 26, 27, 29-31, and 33, Pepper et al. do not specifically disclose a broad area intra-cavity phase conjugator, but Vasil'ev et al. teach a phase conjugation system including a broad area intra-cavity phase conjugator device (the laser diode element in Figure 1b) and, as in the system disclosed by Pepper et al., an external reflector element (the tilted mirror in Figure 1b).

Regarding claims 27 and 33 in particular, the intra-cavity phase conjugator taught by Vasil'ev et al. also includes a top electrode with an aperture (page 40, 2nd complete paragraph in right column, teaches an upper metal contact, or a "top electrode," and also teaches the dimensions of an aperture).

Regarding claims 24, 26, 27, 29-31, and 33, it would have been obvious to a person of ordinary skill in the art to use the phase conjugator taught by Vasil'ev et al. as the phase conjugator in the system disclosed by Pepper et al. as an engineering design choice of a phase conjugating means which does not require a separate source of pump light. Additionally, Vasil'ev et al. teach that their broad area intra-cavity phase conjugator device is less sensitive to misalignments of the external reflector, and it would have been obvious to a person of ordinary

Art Unit: 2613

skill in the art to use the broad area intra-cavity phase conjugator device taught by Vasil'ev et al. in the system disclosed by Pepper et al. in order to reduce the need to precisely align the micro-mirror in the system.

Regarding claim 42, Pepper et al. disclose a method of providing an optical interconnect (Figure 1, for example) comprising:

transmitting an interrogating beam from a fiber optic device (laser 20);

receiving the interrogating beam at a micro-mirror (reflector array 16; column 7, lines 11-22) across free space;

transmitting a second beam from the micro-mirror (i.e., a second beam is reflected from element 16); and

producing a phase conjugate beam 24 of the second beam received from the micro-mirror by a predetermined phase conjugator 12 (column 5, lines 24-61).

Figures 4 and 5 also show similarly numbered elements arranged in slightly different embodiments but still disclosing the method steps as discussed above with regard to Figure 1.

With regard to a "fiber optic device," Pepper et al. specifically disclose that the system they disclose may be used in fiber optic applications (column 5, lines 19-23). It is also well known in the art that the laser element 20 such as they disclose may be suitable for use in a fiber optic system. The claim does not specifically recite optical fiber.

Pepper et al. do not specifically disclose a broad area intra-cavity phase conjugator, but Vasil'ev et al. teach a phase conjugation system including a broad area intra-cavity phase conjugator device (the laser diode element in Figure 1b) and, as in the system disclosed by Pepper et al., an external reflector element (the tilted mirror in Figure 1b). It would have been obvious to

Art Unit: 2613

a person of ordinary skill in the art to use the phase conjugator taught by Vasil'ev et al. as the phase conjugator in the system disclosed by Pepper et al. as an engineering design choice of a phase conjugating means which does not require a separate source of pump light. Additionally, Vasil'ev et al. teach that their broad area intra-cavity phase conjugator device is less sensitive to misalignments of the external reflector, and it would have been obvious to a person of ordinary skill in the art to use the broad area intra-cavity phase conjugator device taught by Vasil'ev et al. in the method disclosed by Pepper et al. in order to reduce the need to precisely align the micro-mirror in the system.

Regarding claim 43, Pepper et al. disclose that the method may further include modulating data onto the second beam at said predetermined phase conjugator (with frequency shifter 62 and/or modulator 64 shown in Figure 4, as well as Figures 6-10; column 8, lines 32-50);

transmitting an encoded phase conjugated beam to the micro-mirror 16.

Regarding claim 44, Pepper et al. disclose that the method may further include transmitting a third beam from the micro-mirror to the fiber optic device. Figure 7, for example, shows how several beams travels from the mirror 16 through lens 106 back toward the fiber optic device (the fiber optic device, shown as a laser 20 in Figure 6, is not explicitly shown in Figure 7 but is discussed by Pepper et al. as part of the system; column 9, lines 56-61).

Allowable Subject Matter

4. Claims 1-23, 34-41, and 45-49 are allowed.

Art Unit: 2613

5. Claims 25, 28, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Y. Leung whose telephone number is 571-272-3023.


The examiner can normally be reached on Monday to Friday, 6:30 to 3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on 571-272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


APPROVED:
JIN F. NG
DIRECTOR, TC 2600


CHRISTINA LEUNG
PRIMARY EXAMINER